

# Notice of Allowability

Application No.

09/817,731

Examiner

Dipakkumar Gandhi

Applicant(s)

PERSSON ET AL.

Art Unit

2117

## -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 10/15/2007.
2. ☒ The allowed claim(s) is/are 41-71, which are renumbered as 1-31.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) ☐ All b) ☐ Some\* c) ☐ None of the:
    1. ☐ Certified copies of the priority documents have been received.
    2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
  - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review ( PTO-948) attached
    - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
  - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

### Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08),  
Paper No./Mail Date \_\_\_\_\_
4. ☐ Examiner's Comment Regarding Requirement for Deposit  
of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413),  
Paper No./Mail Date \_\_\_\_\_
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other \_\_\_\_\_

*Jacques Louis Jacques*  
JACQUES LOUIS JACQUES  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2100

***Allowable Subject Matter***

1. Claims 41-71 are allowed.
2. Claims 1-40 are cancelled.
3. Appeal Brief filed on 10/15/2007 is entered.
4. The following is an examiner's statement of reasons for allowance:

The claimed invention in claim 41 recites features such as: "...determining that an effective signal strength of a signal on a wireless communication link using signal diversity in one or more of the space, time, or frequency domains is insufficient to provide a desired communication range; introducing signal diversity in an additional of the space, time, or frequency domains into the wireless communication link in response to the determining to generate multiple decorrelated signals corresponding to the signal on the wireless communication link."

The prior art of record Lundby et al. (US 6,356,528 B1) teach apparatuses for a transmitter and a receiver which enhance the performance of a system utilizing interleaving and transmit diversity by reordering the sequence of symbols transmitted along the different transmission channels (abstract, Lundby et al.).

Anvari (US 5,461,646) teaches a diversity combiner for a digital receiver that receives a plurality of complex baseband signals ( $S_1(t)$ ,  $S_2(t)$ ) each having an associated receive signal strength-intensity signal ( $RSSI_1$ ,  $RSSI_2$ ). The combiner differentially detects each of the complex baseband signals ( $S_1(t)$ ,  $S_2(t)$ ) to produce a plurality of differential signals ( $RX_1(t)$ ,  $RX_2(t)$ ) (abstract, Anvari).

Tsujimoto (US 5,369,412) teaches that in a sidelobe canceller, a main channel multiplier (11) operates on the baseband output signal of a main antenna (10) with a weight signal to produce a weighted main channel signal. The baseband output signals of auxiliary antennas ( $16_1 \sim 16_n$ ) are adaptively weighted so that the auxiliary antennas have a first directivity pattern (44) whose main lobe oriented toward an undesired signal and summed together to produce a first sum signal ( $y_s$ ), and further adaptively weighted so that the auxiliary antennas have a second directivity pattern (45) whose main lobe is oriented toward a desired signal, and summed together to produce a second sum signal ( $y_d$ ) (abstract, Tsujimoto).

Tolopka et al. (US 6,044,349) teach that a portable storage medium is used to store data and provide access to information from an information dissemination system (IDS). The storage medium can store

one or more location/key pairs. Each of the location/key pairs designates a particular IDS location as well as an access key to the particular IDS location. The storage medium can also store a plurality of information units (abstract, Tolopka et al.).

Molloy et al. (US 6,591,382 B1) teach a system and method for providing improved performance using TCP/IP protocols over wireless networks that can be implemented entirely within the link layer of a protocol stack. The system and method responds to low signal levels caused by weak and fading wireless connections by maintaining throughput and circumventing inappropriate instances of TCP/IP congestion avoidance mode. At least two selectable service protocols, comprising at least one selectable basic error-detecting/correcting protocol and at least one selectable robust error-detecting/correcting protocol, are implemented within link layers of both the mobile station and the base station (abstract, Molloy et al.).

However the prior arts of record do not teach determining that an effective signal strength of a signal on a wireless communication link using signal diversity in one or more of the space, time, or frequency domains is insufficient to provide a desired communication range; introducing signal diversity in an additional of the space, time, or frequency domains into the wireless communication link in response to the determining to generate multiple decorrelated signals corresponding to the signal on the wireless communication link.

Hence, the prior arts of record do not anticipate nor render obvious the claimed invention. Thus, claim 41 is allowable over the prior arts of record.

- The claimed invention in claim 42 recites features such as: "...detecting a degradation of signal quality on the wireless communication link; and dynamically introducing additional diversity on the wireless communication link to result in the wireless communication link having diversity in two or more of the space, time, or frequency domains in response to detecting the degradation of signal quality, to generate a plurality of decorrelated signals."

The prior art of record Lundby et al. (US 6,356,528 B1) teach apparatuses for a transmitter and a receiver which enhance the performance of a system utilizing interleaving and transmit diversity by reordering the sequence of symbols transmitted along the different transmission channels (abstract, Lundby et al.).

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Tsujimoto (US 5,369,412) teaches that in a sidelobe canceller, a main channel multiplier (11) operates on the baseband output signal of a main antenna (10) with a weight signal to produce a weighted main channel signal. The baseband output signals of auxiliary antennas ( $16_1 \sim 16_n$ ) are adaptively weighted so that the auxiliary antennas have a first directivity pattern (44) whose main lobe oriented toward an undesired signal and summed together to produce a first sum signal ( $y_s$ ), and further adaptively weighted so that the auxiliary antennas have a second directivity pattern (45) whose main lobe is oriented toward a desired signal, and summed together to produce a second sum signal ( $y_d$ ) (abstract, Tsujimoto).

Tolopka et al. (US 6,044,349) teach that a portable storage medium is used to store data and provide access to information from an information dissemination system (IDS). The storage medium can store one or more location/key pairs. Each of the location/key pairs designates a particular IDS location as well as an access key to the particular IDS location. The storage medium can also store a plurality of information units (abstract, Tolopka et al.).

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However the prior arts of record do not teach detecting a degradation of signal quality on the wireless communication link; and dynamically introducing additional diversity on the wireless communication link to result in the wireless communication link having diversity in two or more of the space, time, or frequency

domains in response to detecting the degradation of signal quality, to generate a plurality of decorrelated signals.

Hence, the prior arts of record do not anticipate nor render obvious the claimed invention. Thus, claim 42 is allowable over the prior arts of record. Claims 43-54 are allowed because of the combination of additional limitations and the limitations listed above.

- Claim 55 recites similar elements of the invention as mentioned above in claim 42. Thus, claim 55 is allowable over the prior arts of record. Claims 56-57 are allowed because of the combination of additional limitations and the limitations listed above.
- The claimed invention in claim 58 recites features such as: "...a multidimensional diversity agent, coupled to the transceiver, to detect a degradation of signal quality on the wireless communication link, and in response to detecting the degradation of signal quality, selectively introduce additional diversity on the wireless communication link to result in the wireless communication link having diversity in two or more of the space, time, or frequency domains to generate a plurality of decorrelated signals."

The prior art of record Lundby et al. (US 6,356,528 B1) teach apparatuses for a transmitter and a receiver which enhance the performance of a system utilizing interleaving and transmit diversity by reordering the sequence of symbols transmitted along the different transmission channels (abstract, Lundby et al.).

Anvari (US 5,461,646) teaches a diversity combiner for a digital receiver that receives a plurality of complex baseband signals ( $S_1(t)$ ,  $S_2(t)$ ) each having an associated receive signal strength-intensity signal ( $RSSI_1$ ,  $RSSI_2$ ). The combiner differentially detects each of the complex baseband signals ( $S_1(t)$ ,  $S_2(t)$ ) to produce a plurality of differential signals ( $RX_1(t)$ ,  $RX_2(t)$ ) (abstract, Anvari).

Tsujimoto (US 5,369,412) teaches that in a sidelobe canceller, a main channel multiplier (11) operates on the baseband output signal of a main antenna (10) with a weight signal to produce a weighted main channel signal. The baseband output signals of auxiliary antennas ( $16_1 \sim 16_n$ ) are adaptively weighted so that the auxiliary antennas have a first directivity pattern (44) whose main lobe oriented toward an undesired signal and summed together to produce a first sum signal ( $y_s$ ), and further adaptively weighted

so that the auxiliary antennas have a second directivity pattern (45) whose main lobe is oriented toward a desired signal, and summed together to produce a second sum signal ( $y_d$ ) (abstract, Tsujimoto).

Tolopka et al. (US 6,044,349) teach that a portable storage medium is used to store data and provide access to information from an information dissemination system (IDS). The storage medium can store one or more location/key pairs. Each of the location/key pairs designates a particular IDS location as well as an access key to the particular IDS location. The storage medium can also store a plurality of information units (abstract, Tolopka et al.).

Molloy et al. (US 6,591,382 B1) teach a system and method for providing improved performance using TCP/IP protocols over wireless networks that can be implemented entirely within the link layer of a protocol stack. The system and method responds to low signal levels caused by weak and fading wireless connections by maintaining throughput and circumventing inappropriate instances of TCP/IP congestion avoidance mode. At least two selectable service protocols, comprising at least one selectable basic error-detecting/correcting protocol and at least one selectable robust error-detecting/correcting protocol, are implemented within link layers of both the mobile station and the base station (abstract, Molloy et al.).

However the prior arts of record do not teach a multidimensional diversity agent, coupled to the transceiver, to detect a degradation of signal quality on the wireless communication link, and in response to detecting the degradation of signal quality, selectively introduce additional diversity on the wireless communication link to result in the wireless communication link having diversity in two or more of the space, time, or frequency domains to generate a plurality of decorrelated signals.

Hence, the prior arts of record do not anticipate nor render obvious the claimed invention. Thus, claim 58 is allowable over the prior arts of record. Claims 59-66 are allowed because of the combination of additional limitations and the limitations listed above.

- The claimed invention in claim 67 recites features such as: "...determining that an effective signal strength of a signal on a wireless communication link using a level of signal diversity is insufficient to provide a desired communication range for the signal on the wireless communication link; and dynamically introducing an additional level of signal diversity into the wireless communication link

in response to determining that the effective signal strength of the signal is insufficient, to generate additional decorrelated signals.”

The prior art of record Lundby et al. (US 6,356,528 B1) teach apparatuses for a transmitter and a receiver which enhance the performance of a system utilizing interleaving and transmit diversity by reordering the sequence of symbols transmitted along the different transmission channels (abstract, Lundby et al.).

Anvari (US 5,461,646) teaches a diversity combiner for a digital receiver that receives a plurality of complex baseband signals ( $S_1(t)$ ,  $S_2(t)$ ) each having an associated receive signal strength-intensity signal ( $RSSI_1$ ,  $RSSI_2$ ). The combiner differentially detects each of the complex baseband signals ( $S_1(t)$ ,  $S_2(t)$ ) to produce a plurality of differential signals ( $RX_1(t)$ ,  $RX_2(t)$ ) (abstract, Anvari).

Tsujimoto (US 5,369,412) teaches that in a sidelobe canceller, a main channel multiplier (11) operates on the baseband output signal of a main antenna (10) with a weight signal to produce a weighted main channel signal. The baseband output signals of auxiliary antennas ( $16_1 \sim 16_n$ ) are adaptively weighted so that the auxiliary antennas have a first directivity pattern (44) whose main lobe oriented toward an undesired signal and summed together to produce a first sum signal ( $y_s$ ), and further adaptively weighted so that the auxiliary antennas have a second directivity pattern (45) whose main lobe is oriented toward a desired signal, and summed together to produce a second sum signal ( $y_d$ ) (abstract, Tsujimoto).

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protocol, are implemented within link layers of both the mobile station and the base station (abstract, Molloy et al.).

However the prior arts of record do not teach determining that an effective signal strength of a signal on a wireless communication link using a level of signal diversity is insufficient to provide a desired communication range for the signal on the wireless communication link; and dynamically introducing an additional level of signal diversity into the wireless communication link in response to determining that the effective signal strength of the signal is insufficient, to generate additional decorrelated signals.

Hence, the prior arts of record do not anticipate nor render obvious the claimed invention. Thus, claim 67 is allowable over the prior arts of record. Claims 68-71 are allowed because of the combination of additional limitations and the limitations listed above.

- Thus, claims 41-71 are allowable over the prior arts of record.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."



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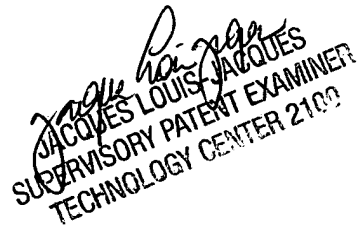
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dipakkumar Gandhi whose telephone number is 571-272-3822. The examiner can normally be reached on 8:30 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jacques Louis-Jacques can be reached on (571) 272-6962. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



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